

LW TTSD specified at 5mA binning FK0PN0



TOPLED®

TOPLED, SMT LED with integrated reflector. With our great experience in SMT LED we are able to offer a high quality product for all kind of applications.



Applications

- Cluster, Button Backlighting
- Electronic Equipment
- Interior Illumination (e.g. Ambient Map)
- White Goods

Features:

- Package: white PLCC-2 package, colored diffused silicone resin
- Chip technology: ThinGaN
- Typ. Radiation: 120° (Lambertian emitter)
- Color: Cx = 0.33, Cy = 0.33 acc. to CIE 1931 (● white)
- Corrosion Robustness Class: 3B
- Qualifications: AEC-Q102 Qualified
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM)

Ordering Information

| Type | Luminous Intensity ¹⁾ $I_F = 5 \text{ mA}$ I_v | Ordering Code |
|--------------------------|---|---------------|
| LW TTSD-R2T1-FK0PN0-W266 | 140 ... 355 mcd | Q65113A1043 |

Maximum Ratings

| Parameter | Symbol | | Values |
|--|-----------|------|--------|
| Operating Temperature | T_{op} | min. | -40 °C |
| | | max. | 110 °C |
| Storage Temperature | T_{stg} | min. | -40 °C |
| | | max. | 110 °C |
| Junction Temperature | T_j | max. | 125 °C |
| Forward Current $T_s = 25\text{ °C}$ | I_F | min. | 1 mA |
| | | max. | 30 mA |
| Surge Current $t \leq 10\ \mu\text{s}$; $D = 0.005$; $T_s = 25\text{ °C}$ | I_{FS} | max. | 200 mA |
| Reverse voltage ²⁾ $T_s = 25\text{ °C}$ | V_R | max. | 5 V |
| ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM) | V_{ESD} | | 2 kV |

Characteristics

$I_F = 5 \text{ mA}$; $T_S = 25 \text{ °C}$

| Parameter | Symbol | | Values |
|--|-------------------------|------|--------------------|
| Chromaticity Coordinate ³⁾ | C_x | typ. | 0.33 |
| | C_y | typ. | 0.33 |
| Viewing angle at 50% I_V | 2ϕ | typ. | 120 ° |
| Forward Voltage ⁴⁾ $I_F = 5 \text{ mA}$ | V_F | min. | 2.60 V |
| | | typ. | 2.80 V |
| | | max. | 3.30 V |
| Reverse current ²⁾ $V_R = 5 \text{ V}$ | I_R | typ. | 0.01 μA |
| | | max. | 10 μA |
| Real thermal resistance junction/ambient ⁵⁾⁶⁾ | $R_{thJA \text{ real}}$ | max. | 340 K / W |
| Real thermal resistance junction/solderpoint ⁵⁾ | $R_{thJS \text{ real}}$ | max. | 180 K / W |

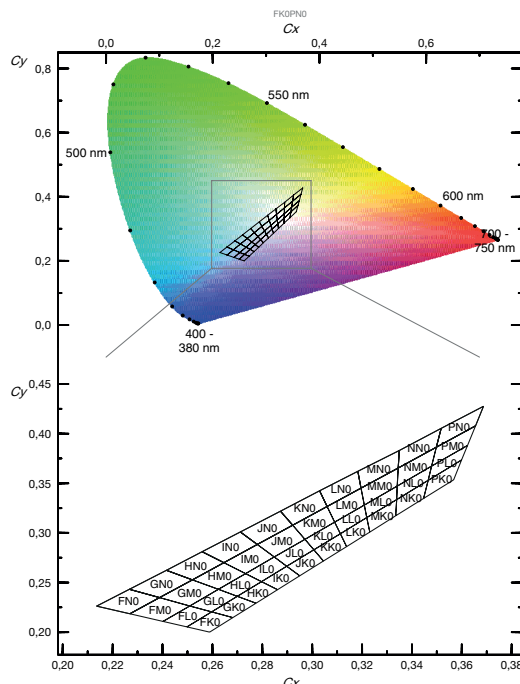
Brightness Groups

| Group | Luminous Intensity ¹⁾ $I_F = 5 \text{ mA}$ min. I_v | Luminous Intensity ¹⁾ $I_F = 5 \text{ mA}$ max. I_v | Luminous Flux ⁷⁾ $I_F = 5 \text{ mA}$ typ. Φ_v |
|-------|---|---|---|
| R2 | 140 mcd | 180 mcd | 480 mlm |
| S1 | 180 mcd | 224 mcd | 606 mlm |
| S2 | 224 mcd | 280 mcd | 756 mlm |
| T1 | 280 mcd | 355 mcd | 953 mlm |

Forward Voltage Groups

| Group | Forward Voltage ⁴⁾ $I_F = 5 \text{ mA}$ min. V_F | Forward Voltage ⁴⁾ $I_F = 5 \text{ mA}$ max. V_F |
|-------|--|--|
| W2 | 2.60 V | 2.70 V |
| Z6 | 2.70 V | 3.00 V |
| 66 | 3.00 V | 3.30 V |

Chromaticity Coordinate Groups



Chromaticity Coordinate Groups ³⁾

| Group | Cx | Cy | Group | Cx | Cy | Group | Cx | Cy |
|-------|--------|--------|-------|--------|--------|-------|--------|--------|
| FK0 | 0.2498 | 0.2053 | GK0 | 0.2597 | 0.2204 | HK0 | 0.2700 | 0.2361 |
| | 0.2597 | 0.2204 | | 0.2700 | 0.2361 | | 0.2797 | 0.2509 |
| | 0.2682 | 0.2146 | | 0.2775 | 0.2292 | | 0.2861 | 0.2427 |
| | 0.2589 | 0.2000 | | 0.2682 | 0.2146 | | 0.2775 | 0.2292 |
| FL0 | 0.2402 | 0.2108 | GL0 | 0.2509 | 0.2264 | HL0 | 0.2624 | 0.2431 |
| | 0.2509 | 0.2264 | | 0.2624 | 0.2431 | | 0.2733 | 0.2590 |
| | 0.2597 | 0.2204 | | 0.2700 | 0.2361 | | 0.2797 | 0.2509 |
| | 0.2498 | 0.2053 | | 0.2597 | 0.2204 | | 0.2700 | 0.2361 |
| FM0 | 0.2269 | 0.2185 | GM0 | 0.2388 | 0.2348 | HM0 | 0.2520 | 0.2527 |
| | 0.2388 | 0.2348 | | 0.2520 | 0.2527 | | 0.2646 | 0.2700 |
| | 0.2509 | 0.2264 | | 0.2624 | 0.2431 | | 0.2733 | 0.2590 |
| | 0.2402 | 0.2108 | | 0.2509 | 0.2264 | | 0.2624 | 0.2431 |
| FNO | 0.2136 | 0.2262 | GN0 | 0.2267 | 0.2432 | HN0 | 0.2416 | 0.2623 |
| | 0.2267 | 0.2432 | | 0.2416 | 0.2623 | | 0.2559 | 0.2810 |
| | 0.2388 | 0.2348 | | 0.2520 | 0.2527 | | 0.2646 | 0.2700 |
| | 0.2269 | 0.2185 | | 0.2388 | 0.2348 | | 0.2520 | 0.2527 |

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| Group | Cx | Cy | Group | Cx | Cy | Group | Cx | Cy |
|-------|--------|--------|-------|--------|--------|-------|--------|--------|
| IK0 | 0.2797 | 0.2509 | KK0 | 0.3007 | 0.2830 | MK0 | 0.3219 | 0.3154 |
| | 0.2898 | 0.2664 | | 0.3113 | 0.2992 | | 0.3339 | 0.3336 |
| | 0.2950 | 0.2568 | | 0.3138 | 0.2862 | | 0.3335 | 0.3172 |
| | 0.2861 | 0.2427 | | 0.3045 | 0.2717 | | 0.3231 | 0.3008 |
| ILO | 0.2733 | 0.2590 | KLO | 0.2971 | 0.2935 | MLO | 0.3209 | 0.3281 |
| | 0.2848 | 0.2757 | | 0.3090 | 0.3108 | | 0.3341 | 0.3472 |
| | 0.2898 | 0.2664 | | 0.3113 | 0.2992 | | 0.3339 | 0.3336 |
| | 0.2797 | 0.2509 | | 0.3007 | 0.2830 | | 0.3219 | 0.3154 |
| IMO | 0.2646 | 0.2700 | KMO | 0.2922 | 0.3077 | MM0 | 0.3196 | 0.3451 |
| | 0.2780 | 0.2883 | | 0.3060 | 0.3266 | | 0.3345 | 0.3654 |
| | 0.2848 | 0.2757 | | 0.3090 | 0.3108 | | 0.3341 | 0.3472 |
| | 0.2733 | 0.2590 | | 0.2971 | 0.2935 | | 0.3209 | 0.3281 |
| INO | 0.2559 | 0.2810 | KNO | 0.2873 | 0.3219 | MNO | 0.3183 | 0.3621 |
| | 0.2712 | 0.3009 | | 0.3030 | 0.3424 | | 0.3349 | 0.3830 |
| | 0.2780 | 0.2883 | | 0.3060 | 0.3266 | | 0.3345 | 0.3654 |
| | 0.2646 | 0.2700 | | 0.2922 | 0.3077 | | 0.3196 | 0.3451 |
| JK0 | 0.2898 | 0.2664 | LKO | 0.3113 | 0.2992 | NKO | 0.3339 | 0.3336 |
| | 0.3007 | 0.2830 | | 0.3219 | 0.3154 | | 0.3465 | 0.3530 |
| | 0.3045 | 0.2717 | | 0.3231 | 0.3008 | | 0.3447 | 0.3347 |
| | 0.2950 | 0.2568 | | 0.3138 | 0.2862 | | 0.3335 | 0.3172 |
| JLO | 0.2848 | 0.2757 | LLO | 0.3090 | 0.3108 | NLO | 0.3341 | 0.3472 |
| | 0.2971 | 0.2935 | | 0.3209 | 0.3281 | | 0.3479 | 0.3673 |
| | 0.3007 | 0.2830 | | 0.3219 | 0.3154 | | 0.3465 | 0.3530 |
| | 0.2898 | 0.2664 | | 0.3113 | 0.2992 | | 0.3339 | 0.3336 |
| JMO | 0.2780 | 0.2883 | LMO | 0.3060 | 0.3266 | NMO | 0.3345 | 0.3654 |
| | 0.2922 | 0.3077 | | 0.3196 | 0.3451 | | 0.3498 | 0.3863 |
| | 0.2971 | 0.2935 | | 0.3209 | 0.3281 | | 0.3479 | 0.3673 |
| | 0.2848 | 0.2757 | | 0.3090 | 0.3108 | | 0.3341 | 0.3472 |
| JNO | 0.2712 | 0.3009 | LNO | 0.3030 | 0.3424 | NNO | 0.3349 | 0.3830 |
| | 0.2873 | 0.3219 | | 0.3183 | 0.3621 | | 0.3517 | 0.4053 |
| | 0.2922 | 0.3077 | | 0.3196 | 0.3451 | | 0.3498 | 0.3863 |
| | 0.2780 | 0.2883 | | 0.3060 | 0.3266 | | 0.3345 | 0.3654 |

LW TTSD specified at 5mA binning FK0PN0

| Group | Cx | Cy | Group | Cx | Cy |
|-------|--------|--------|-------|--------|--------|
| PK0 | 0.3465 | 0.3530 | PM0 | 0.3498 | 0.3863 |
| | 0.3599 | 0.3735 | | 0.3655 | 0.4079 |
| | 0.3567 | 0.3535 | | 0.3623 | 0.3882 |
| | 0.3447 | 0.3347 | | 0.3479 | 0.3673 |
| PL0 | 0.3479 | 0.3673 | PN0 | 0.3517 | 0.4053 |
| | 0.3623 | 0.3882 | | 0.3687 | 0.4276 |
| | 0.3599 | 0.3735 | | 0.3655 | 0.4079 |
| | 0.3465 | 0.3530 | | 0.3498 | 0.3863 |

LW TTSD specified at 5mA binning FK0PN0

Group Name on Label

Example: R2-FK0-66

Brightness

Color Chromaticity

Forward Voltage

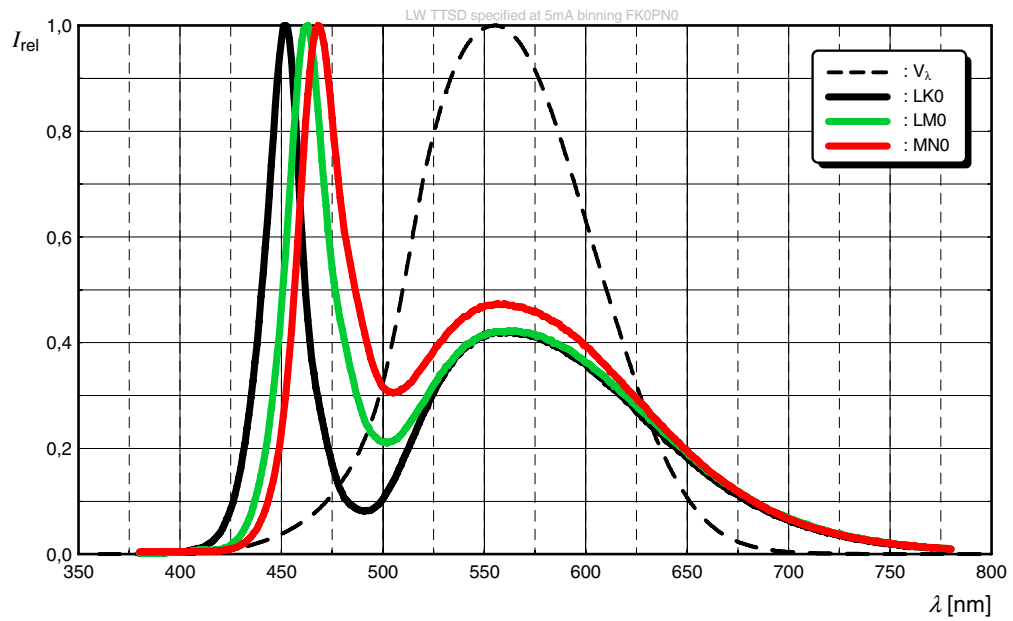
R2

FK0

66

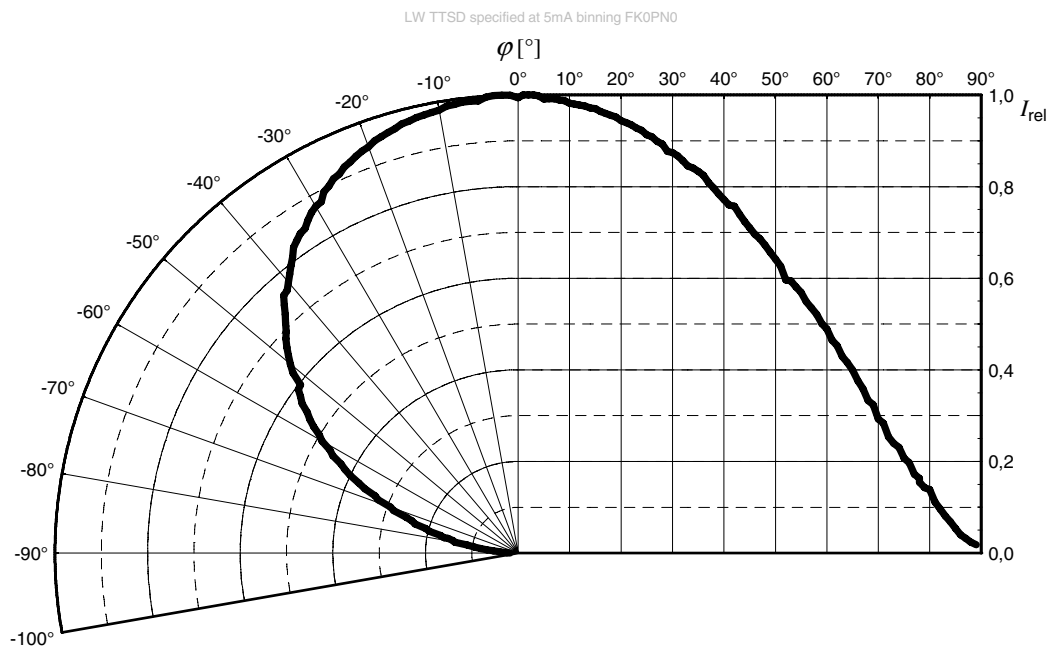
Relative Spectral Emission ⁷⁾

$$I_{rel} = f(\lambda); I_F = 5 \text{ mA}; T_S = 25 \text{ }^\circ\text{C}$$



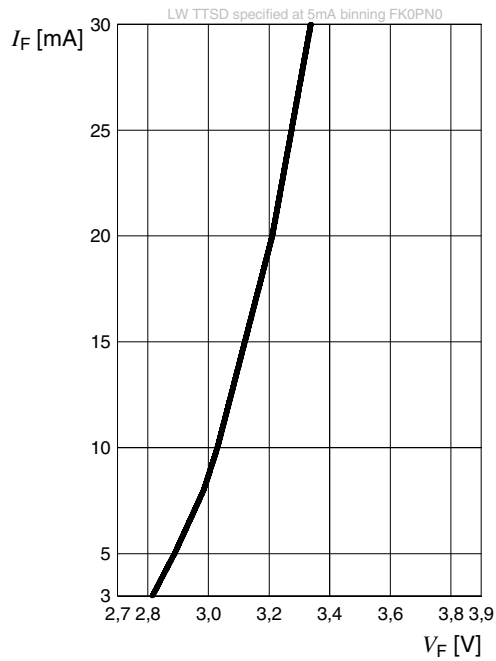
Radiation Characteristics ⁷⁾

$$I_{rel} = f(\phi); T_S = 25 \text{ }^\circ\text{C}$$



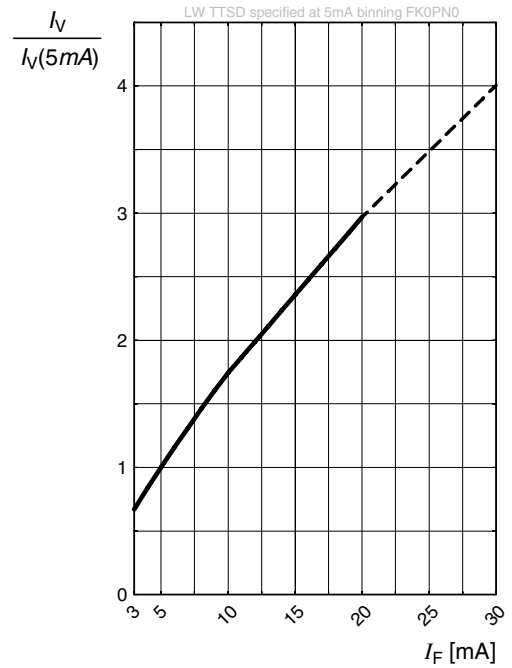
Forward current ⁷⁾

$$I_F = f(V_F); T_S = 25\text{ }^\circ\text{C}$$



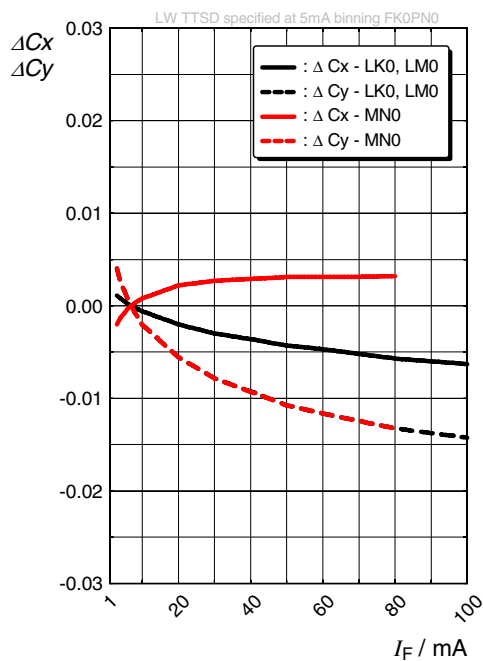
Relative Luminous Intensity ^{7), 8)}

$$I_V/I_V(5\text{ mA}) = f(I_F); T_S = 25\text{ }^\circ\text{C}$$



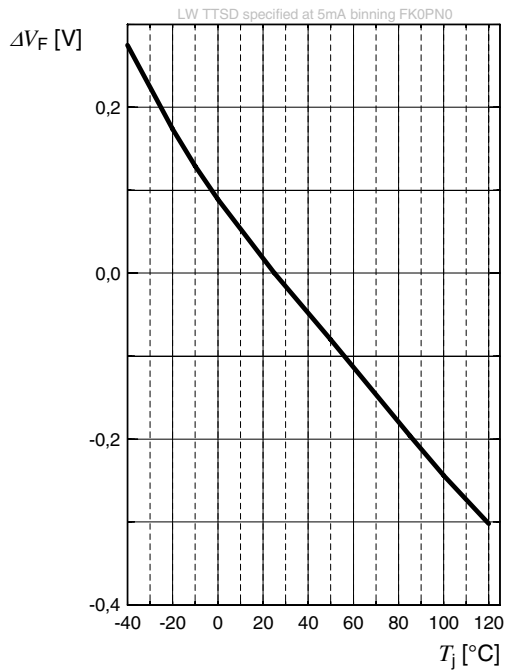
Chromaticity Coordinate Shift ⁷⁾

$$\Delta C_x, \Delta C_y = f(I_F); T_S = 25\text{ }^\circ\text{C}$$



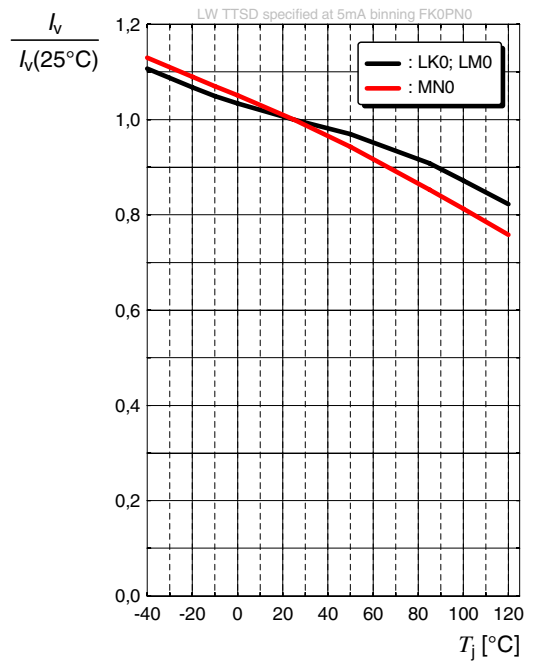
Forward Voltage ⁷⁾

$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j); I_F = 5\text{ mA}$$



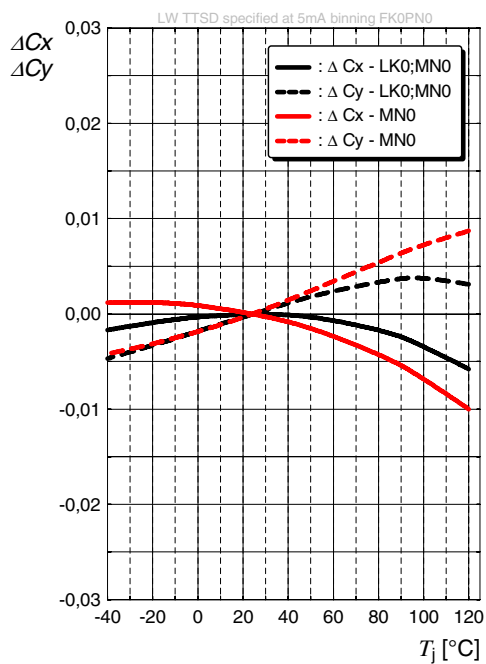
Relative Luminous Intensity ⁷⁾

$$I_V/I_V(25^\circ\text{C}) = f(T_j); I_F = 5\text{ mA}$$



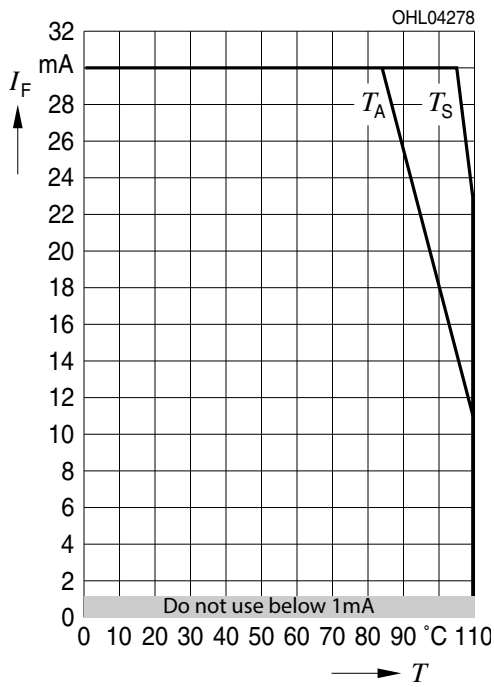
Chromaticity Coordinate Shift ⁷⁾

$$\Delta C_x, \Delta C_y = f(T_j); I_F = 5\text{ mA}$$



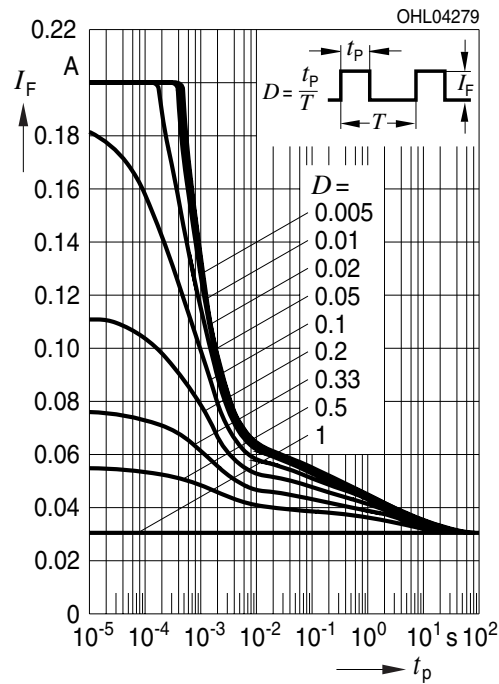
Max. Permissible Forward Current

$I_F = f(T)$



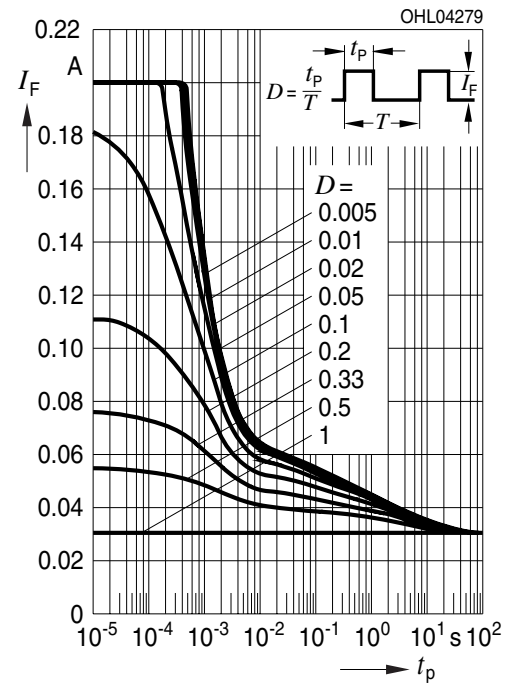
Permissible Pulse Handling Capability

$I_F = f(t_p)$; D: Duty cycle; $T_S = 25\text{ }^\circ\text{C}$

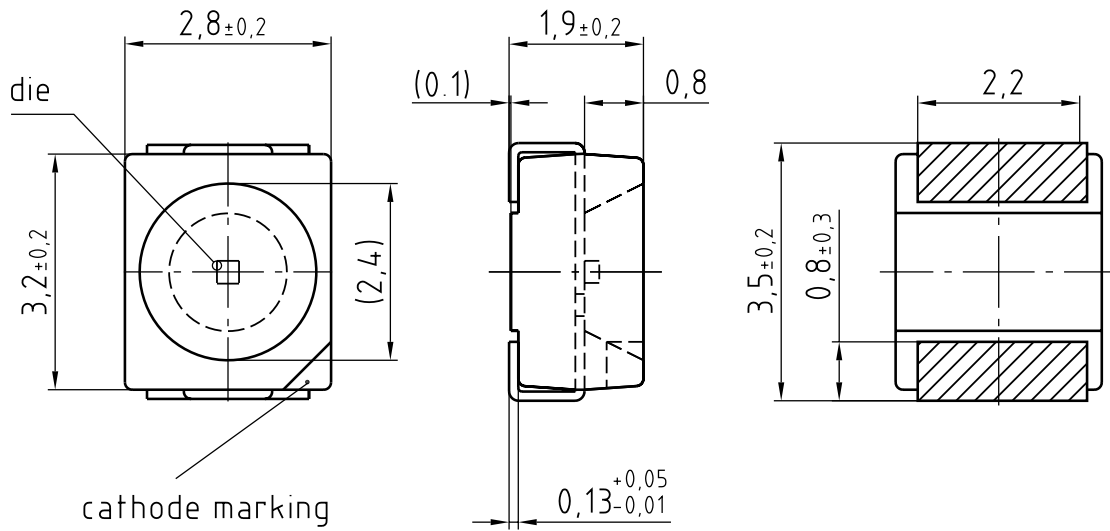


Permissible Pulse Handling Capability

$I_F = f(t_p)$; D: Duty cycle; $T_S = 85\text{ }^\circ\text{C}$



Dimensional Drawing ⁹⁾



general tolerance $\pm 0,1$

lead finish Sn 

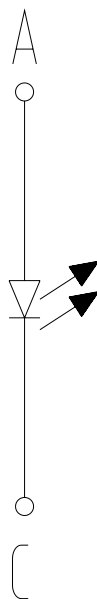
C63062-A3863-A4...-03

Further Information:

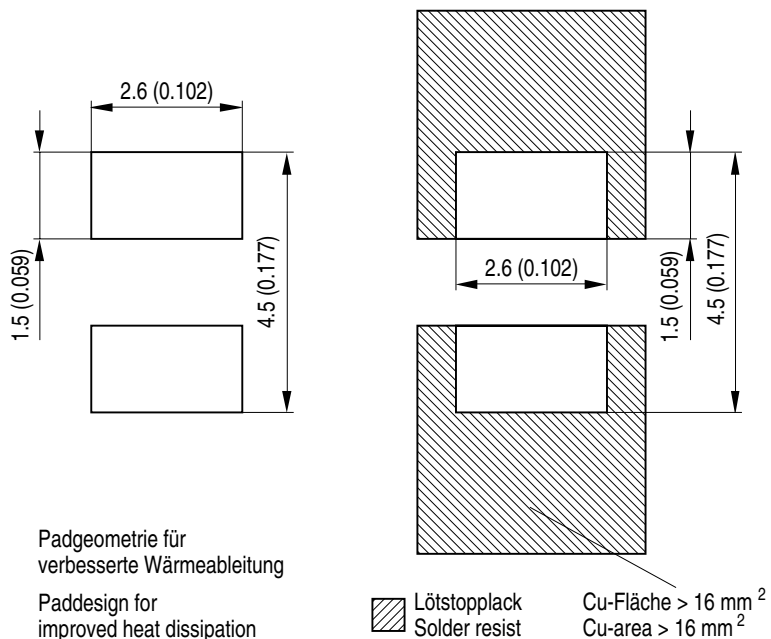
Approximate Weight: 32.0 mg

Corrosion test: Class: 3B
Test condition: 40°C / 90 % RH / 15 ppm H₂S / 14 days (stricter than IEC 60068-2-43)

Electrical Internal Circuit

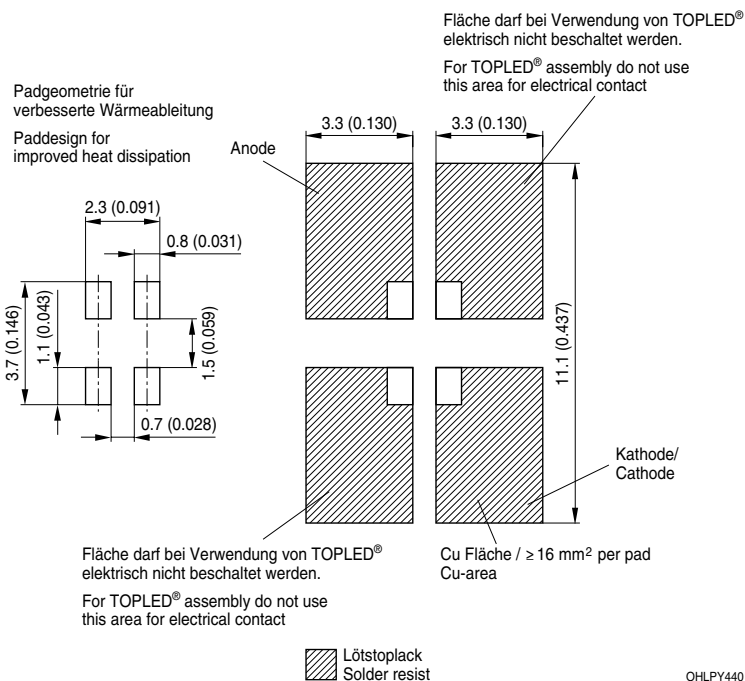


Recommended Solder Pad ⁹⁾



OHLPY970

Recommended Solder Pad ⁹⁾



OHLPY440

For superior solder joint connectivity results we recommend soldering under standard nitrogen atmosphere. Package not suitable for ultra sonic cleaning.

Reflow Soldering Profile

Product complies to MSL Level 2 acc. to JEDEC J-STD-020E

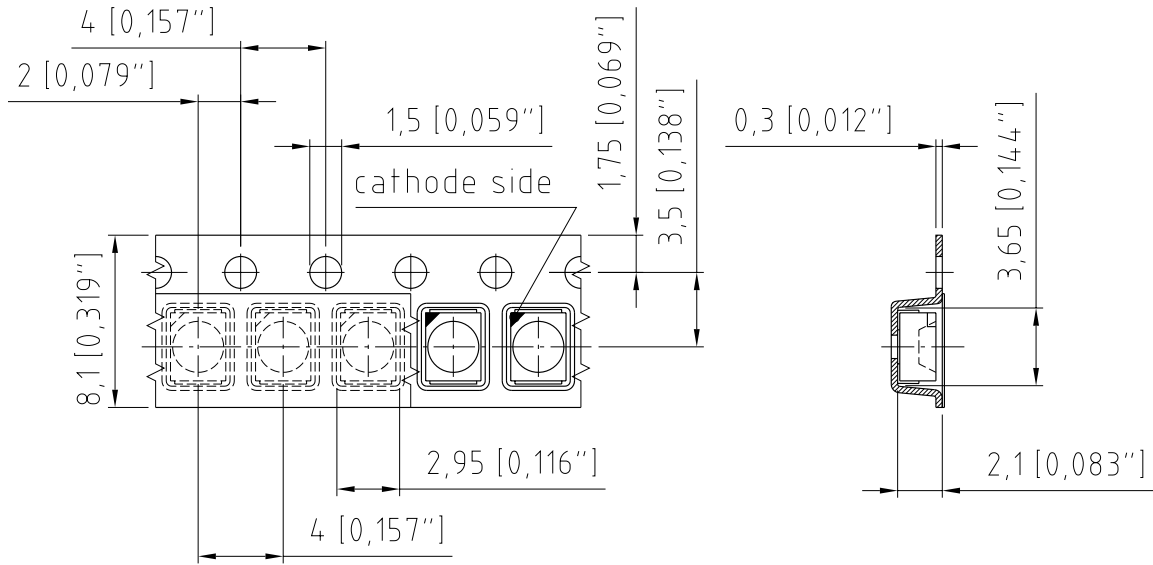


| Profile Feature | Symbol | Pb-Free (SnAgCu) Assembly | | | Unit |
|---|--------|---------------------------|----------------|---------|------|
| | | Minimum | Recommendation | Maximum | |
| Ramp-up rate to preheat ^{*)} 25 °C to 150 °C | | | 2 | 3 | K/s |
| Time t_s T_{Smin} to T_{Smax} | t_s | 60 | 100 | 120 | s |
| Ramp-up rate to peak ^{*)} T_{Smax} to T_p | | | 2 | 3 | K/s |
| Liquidus temperature | T_L | | 217 | | °C |
| Time above liquidus temperature | t_L | | 80 | 100 | s |
| Peak temperature | T_p | | 245 | 260 | °C |
| Time within 5 °C of the specified peak temperature $T_p - 5$ K | t_p | 10 | 20 | 30 | s |
| Ramp-down rate* T_p to 100 °C | | | 3 | 6 | K/s |
| Time 25 °C to T_p | | | | 480 | s |

All temperatures refer to the center of the package, measured on the top of the component

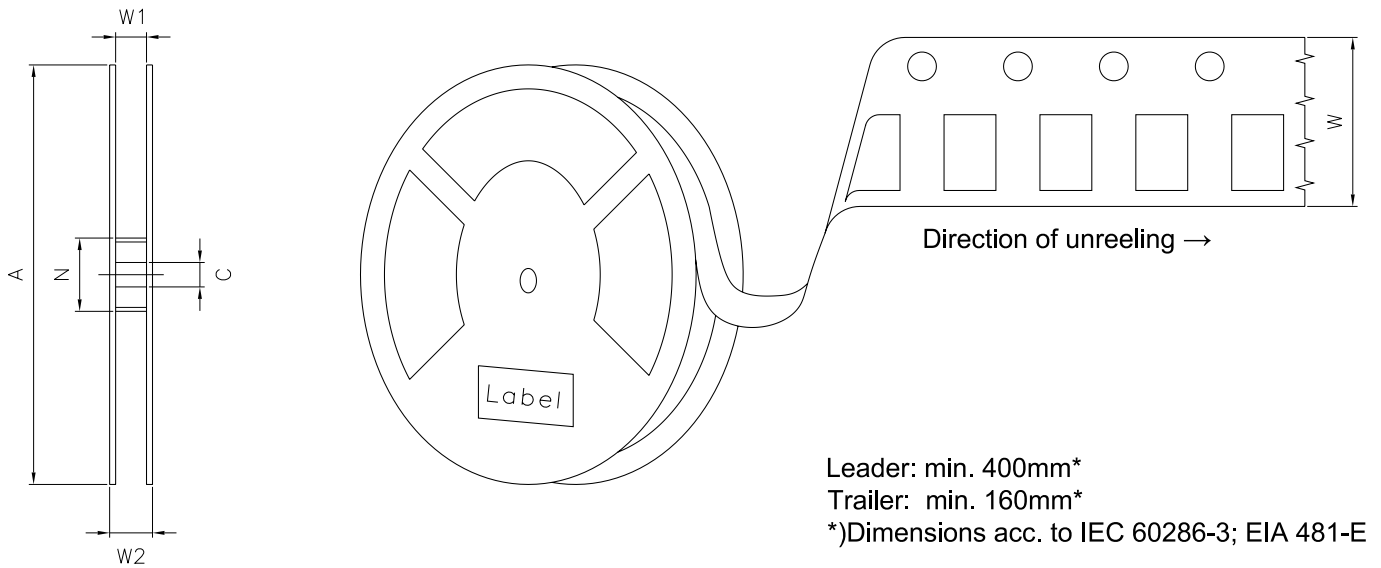
* slope calculation DT/Dt : Dt max. 5 s; fulfillment for the whole T-range

Taping ⁹⁾



C63062-A3863-B3 -02

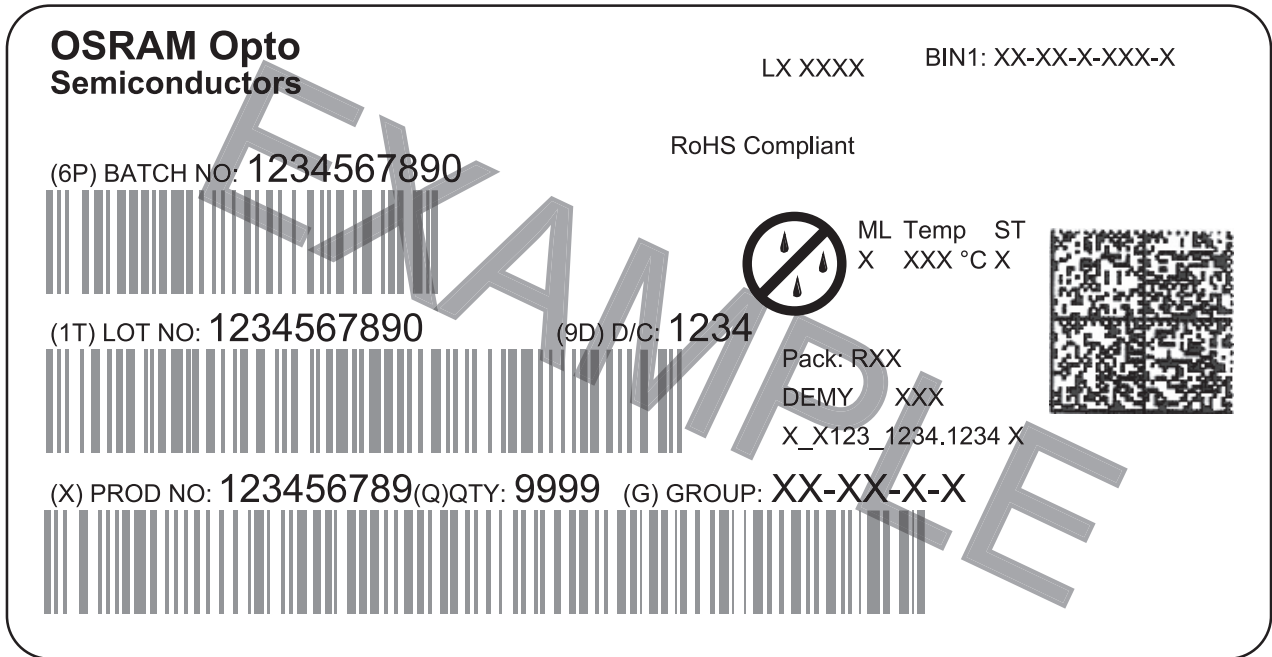
Tape and Reel ¹⁰⁾



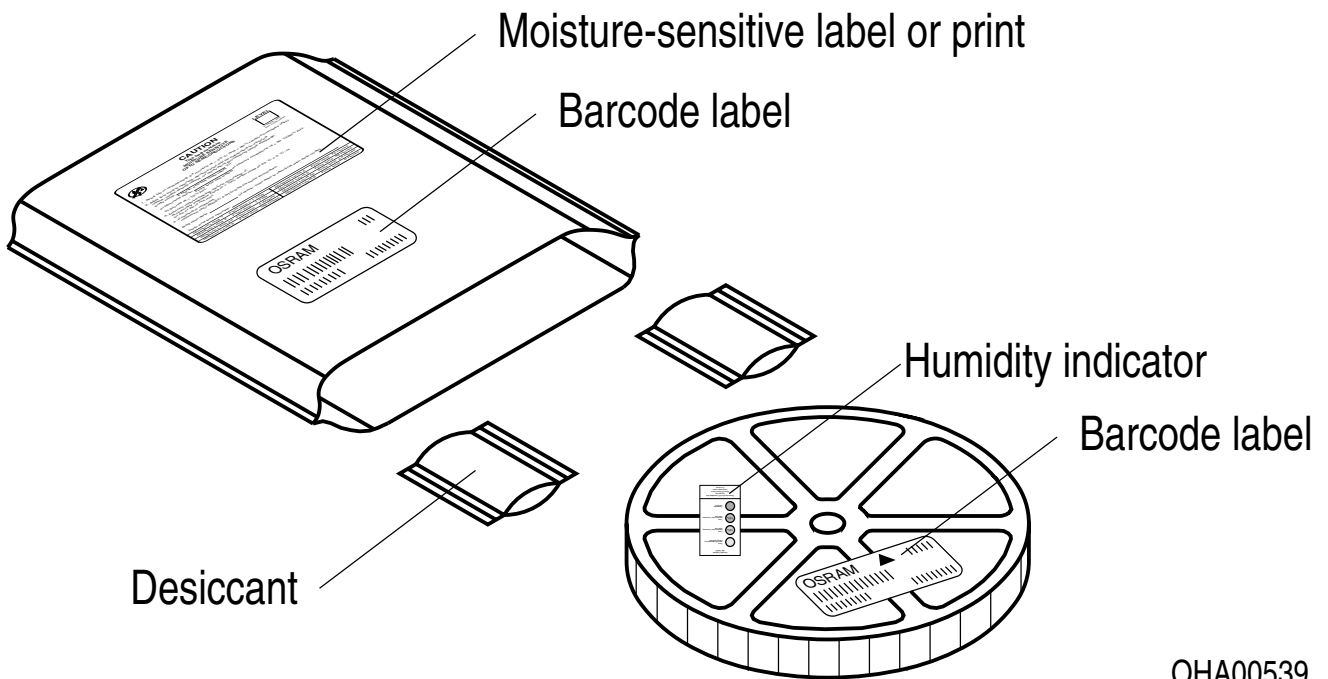
Reel Dimensions

| A | W | N_{\min} | W_1 | $W_{2\max}$ | Pieces per PU |
|--------|--------------------|------------|------------|-------------|---------------|
| 180 mm | 8 + 0.3 / - 0.1 mm | 60 mm | 8.4 + 2 mm | 14.4 mm | 2000 |
| 330 mm | 8 + 0.3 / - 0.1 mm | 60 mm | 8.4 + 2 mm | 14.4 mm | 8000 |

Barcode-Product-Label (BPL)

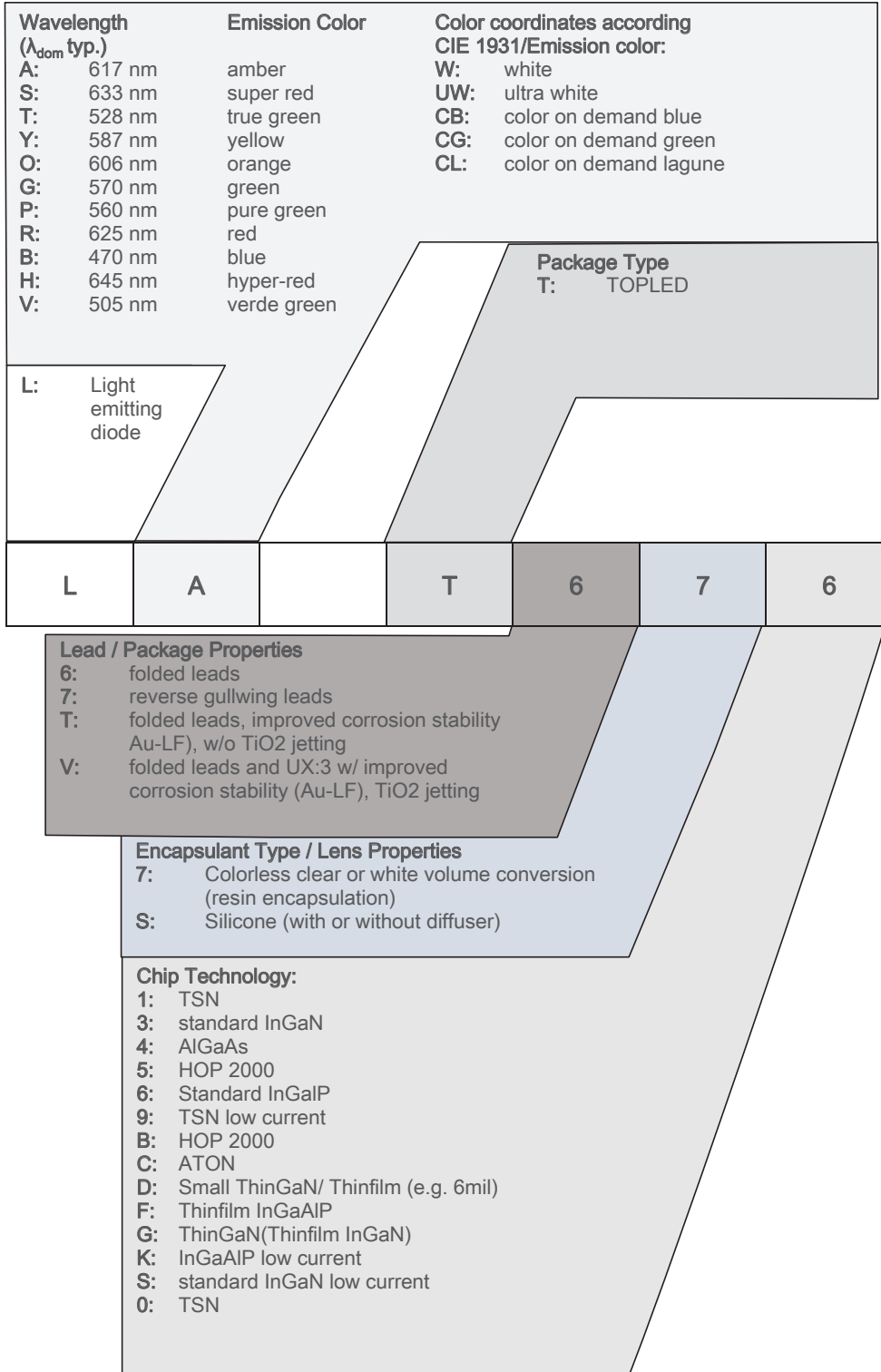


Dry Packing Process and Materials ⁹⁾



Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card according JEDEC-STD-033.

Type Designation System



Notes

The evaluation of eye safety occurs according to the standard IEC 62471:2006 (photo biological safety of lamps and lamp systems). Within the risk grouping system of this IEC standard, the device specified in this data sheet falls into the class **exempt group (exposure time 10000 s)**. Under real circumstances (for exposure time, conditions of the eye pupils, observation distance), it is assumed that no endangerment to the eye exists from these devices. As a matter of principle, however, it should be mentioned that intense light sources have a high secondary exposure potential due to their blinding effect. When looking at bright light sources (e.g. headlights), temporary reduction in visual acuity and afterimages can occur, leading to irritation, annoyance, visual impairment, and even accidents, depending on the situation.

Subcomponents of this device contain, in addition to other substances, metal filled materials including silver. Metal filled materials can be affected by environments that contain traces of aggressive substances. Therefore, we recommend that customers minimize device exposure to aggressive substances during storage, production, and use. Devices that showed visible discoloration when tested using the described tests above did show no performance deviations within failure limits during the stated test duration. Respective failure limits are described in the IEC60810.

For further application related information please visit www.osram-os.com/appnotes

Disclaimer

Attention please!

The information describes the type of component and shall not be considered as assured characteristics. Terms of delivery and rights to change design reserved. Due to technical requirements components may contain dangerous substances.

For information on the types in question please contact our Sales Organization.

If printed or downloaded, please find the latest version on the OSRAM OS website.

Packing

Please use the recycling operators known to you. We can also help you – get in touch with your nearest sales office. By agreement we will take packing material back, if it is sorted. You must bear the costs of transport. For packing material that is returned to us unsorted or which we are not obliged to accept, we shall have to invoice you for any costs incurred.

Product and functional safety devices/applications or medical devices/applications

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Glossary

- 1) **Brightness:** Brightness values are measured during a current pulse of typically 25 ms, with an internal reproducibility of $\pm 8\%$ and an expanded uncertainty of $\pm 11\%$ (acc. to GUM with a coverage factor of $k = 3$).
- 2) **Reverse Operation:** This product is intended to be operated applying a forward current within the specified range. Applying any continuous reverse bias or forward bias below the voltage range of light emission shall be avoided because it may cause migration which can change the electro-optical characteristics or damage the LED.
- 3) **Chromaticity coordinate groups:** Chromaticity coordinates are measured during a current pulse of typically 25 ms, with an internal reproducibility of ± 0.005 and an expanded uncertainty of ± 0.01 (acc. to GUM with a coverage factor of $k = 3$).
- 4) **Forward Voltage:** The forward voltage is measured during a current pulse of typically 8 ms, with an internal reproducibility of ± 0.05 V and an expanded uncertainty of ± 0.1 V (acc. to GUM with a coverage factor of $k = 3$).
- 5) **Thermal Resistance:** $R_{th\ max}$ is based on statistic values (6σ).
- 6) **Thermal Resistance:** R_{thJA} results from mounting on PC board FR 4 (pad size 16 mm² per pad)
- 7) **Typical Values:** Due to the special conditions of the manufacturing processes of semiconductor devices, the typical data or calculated correlations of technical parameters can only reflect statistical figures. These do not necessarily correspond to the actual parameters of each single product, which could differ from the typical data and calculated correlations or the typical characteristic line. If requested, e.g. because of technical improvements, these typ. data will be changed without any further notice.
- 8) **Characteristic curve:** In the range where the line of the graph is broken, you must expect higher differences between single devices within one packing unit.
- 9) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ± 0.1 and dimensions are specified in mm.
- 10) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

Revision History

| Version | Date | Change |
|---------|------------|---|
| 1.1 | 2019-09-09 | Dimensional Drawing |
| 1.2 | 2020-05-26 | Ordering Information Characteristics Electro - Optical Characteristics (Diagrams) |
| 1.2 | 2020-06-03 | Ordering Information Characteristics Electro - Optical Characteristics (Diagrams) |

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